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An experimental study examined the possibility that proximity error could bias results from semantic differential questionnaires. Proximity error occurs when, due to the ordering, or polarity, of the differential scales, one answer on the semantic differential results in another answer to a subsequent question being substantially changed from what it would otherwise be. A computer produced a set of semantic differential questionnaires which were controlled for various kinds of proximity error--effects due to order of concept presentation, of adjective presentation, and of order of adjectives within a particular scale. Three experiments were conducted varying questionnaires and types of proximity error. In each experiment all measures indicated no significant differences in response traceable to questionnaire format manipulations, showing that proximity error was not a problem in administering semantic differential questionnaires. (BB)

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REDUCING PROXIMITY ERROR IN ADMINISTERING THE SEMANTIC DIFFERENTIAL

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Reducing Proximity Error in Administering the Semantic Differential

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Summary

This research was conducted in two stages. The first stage consisted of applying a theoretical solution to the problem of progressive effects and treatment interaction commonly called proximity error to administrations of semantic differential (SD) questionnaires. The second stage consisted of ascertaining whether or not manipulating various sources of proximity error produced discernably different response patterns among Ss completing SD questionnaires.

The objective in stage one was to design a computer program such that the output would consist of sets of SD questionnaires. For any given set of questionnaires from zero to three sources of proximity error were to be minimizable at the discretion of E. The three sources of proximity error include (1) effects of the order in which SD concepts are presented, (2) effects of the order in which SD adjective scales are presented, and (3) effects of the order in which adjectives appear within a given SD scale.

A program meeting this objective was created, tested, and used for production runs of SD questionnaires. Proximity errors stemming from concept order or scale order were minimized by devising a subroutine based on a recent theoretical solution of the proximity error problem for tests containing as many as 22 items. Thus the program can accept at most 22 concepts each of which may be rated on at most 22 SD scales. Proximity errors arising from adjectival order within a scale were minimized by applying a random number generating subroutine that selects which of the two adjectives to print first. The program is organized so that E may use none, one or both of these subroutines to control any or all of these sources of proximity error. Additionally each SD questionnaire contains a set of directions for the respondant.

Although the program was developed specifically for producing SD questionnaires having variable formats, it may be modified to produce other sorts of questionnaires or tests in which E wishes to manipulate sources of proximity error.

In stage two of this research three experiments were conducted to determine the effects of controlling sources of proximity error on responses to SD questionnaires. In Experiment I responses to SD questionnaires in which all three sources of proximity error (concept order, scale order, and adjective order within scales) were varied were compared with responses to SD questionnaires in which all three orders were left invariant. In experiment II the two SD questionnaire formats were (1) all three orderings varied and (2) four different concept orders, but fixed scale order and fixed adjective order within

scales. In Experiment III the formats were (1) only adjective order within scales controlled and (2) four different concept orders, but fixed scale order and fixed adjective order within scales. The SD questionnaires consisted of nine concepts each of which was to be rated on 14 SD scales. For each concept within each treatment of each experiment a 14 X 14 matrix of intercorrelations was computed, factored, and rotated to the Varimax criterion. After examining the proportion of total variance accounted for by the first four factors as well as the rotated factor structures further analyses were limited to factors I and II.

Three measures of differences between responses to the two types of SD questionnaires were analyzed: differences in rotated factor structures, differences in factor scores concept-by-concept, and differences on a measure labeled "response consistency." In each experiment all measures indicate no significant differences in responses of Ss traceable to questionnaire format manipulations. Subject to the constraints on the generalizability of these results it appears that Es need not be concerned about proximity error effects when administering SD questionnaires. Fixed orderings of concepts, scales, and adjectives within scales failed to induce any significant differences in response patterns when compared with orderings varied in such a way that sources of proximity error were controlled.

Introduction

The first objective of this research was to develop a practical method of producing a set of SD questionnaires in which theoretical item order effects may be minimized by using an electronic computer to produce the questionnaires. The second objective was to determine the effects of controlling various combinations of three distinct sources of order bias in SD administrations by using computer generated SD questionnaires.

The body of this report is organized into two sections each dealing with those aspects of the research which bear on one of the objectives listed above. Each section may be studied independently of the other.

The Computer Program

The typical semantic differential questionnaire consists of directions to S followed by the first concept with its associated adjectival scales. Realizing that progressive effects and treatment interaction known as proximity errors may occur, E determines the order and polarity of the scales in a random fashion. Thus, while the ordering of the scales and their polarity remains invariant throughout the data collection, at least the effects are free of E's bias with respect to the variables being studied. Order effects among the concepts included are often accounted for by presenting the concepts to Ss in several different randomly determined orders. The solution, then, has been to take account of but not necessarily minimize, proximity error within SD questionnaires.

While the weaknesses of this solution appear obvious, better solutions have not been feasible economically in the past. Print shop and office duplicating machines are not designed to produce variable formats. Moreover, E would not have been sure that he was reducing substantially proximity error by having a number of different versions of SD questionnaires used in his data collection. Houston (1967) has shown that if a sequence of k tasks is varied from S to S, proximity error will be reduced and if every possible permutation of k tasks occurs with equal frequency proximity error would be controlled optimally. However ${}_kP_k = k!$, which increases dramatically as k increases; there are usually too few S's available to make an optimum solution possible.

Bradley (1958), Alimena (1962), and Houston (1966) have reported methods of using cyclic Latin squares as generators of reasonably small sets of permutations of k tasks having the property of reduced proximity error. Houston (1967) designed an heuristic search program for the CDC 1604 computer which inspected random permutations of k items ($k \leq 22$) to be used to generate cyclic Latin squares such that proximity error reduction would be maximized. For $k > 6$, his results represent improvements over earlier techniques of one order of magnitude or more. Thus a theoretical solution to the problem of proximity error within a sequence of up to 22 tasks is available for testing. First columns for Houston's Latin squares may be found in Appendix A.

While a theoretical solution to the problem of proximity bias seems to be available for $k \leq 22$ there is no reasonable way to utilize these results if ordinary duplicating equipment is used to prepare questionnaires. To overcome this difficulty a computer program to generate SD questionnaires was developed for the IBM 7094.

Specifications of the Computer Program

The program for the production of SD questionnaires takes account of three sources of order effects: (1) the order of concept presentation; (2) the order of the adjectival scales used to measure the meaning of each concept; and (3) the polarity of each scale (which end is positive). Proximity errors caused by concept order and scale order are minimized by using the particular permutation of k items found by Houston to generate the k x k Latin square yielding the most favorable index of proximity error. Scale polarity is determined scale-by-scale by reference to a random digit generating function.

The output from the computing system's printer is a set of SD questionnaires for as many as 999 Ss. Each questionnaire may be composed of at most 22 concepts each of which may be rated on at most 22 adjectival scales. Each questionnaire includes a standard set of directions as suggested by Osgood, Suci, and Tannenbaum (1957). The program is written so that E may invoke or ignore subroutines designed to minimize each type of order effect. For example, E may use the appropriate Latin square generator to reduce proximity bias due to scale ordering while holding concept order and scale polarity invariant. Sample SD questionnaires produced with this program appear in Appendices B, C, and D.

A printout of the program deck appears in Appendix E. Immediately following the program deck data cards are inserted. The formats of these cards are outlined below.

Card 1

Columns 1-3	concept order option
Columns 4-6	scale order option
Columns 7-9	scale polarity option

For each of these options:

a. If any column in the 3-column field contains a 1, the associated subroutine is ignored.

b. If all columns in the 3-column field contain anything except a 1, the associated subroutine is invoked.

Columns 10-12	Insert the number of questionnaires to be produced (up to 999).
Columns 13-15	Insert the number of SD concepts in each questionnaire (up to 022).
Columns 16-18	Insert the number of scales for each concept (up to 022).

If 10 or more concepts are being included:

Columns 19-24	(_ _ I2), where the number of concepts is inserted in columns 20 and 21.

If fewer than 10 concepts are being included:

Column 19	Blank
Columns 20-24	(_ I2), where the number of concepts is inserted in column 21.

If 10 or more scales are being included:

Columns 25-30	(_ _ I2), where the number of scales is inserted in columns 26 and 27.

If fewer than 10 scales are being included:

Column 25	Blank
Columns 26-30	(_ I2), where the number of scales is inserted in column 27.

Card 2

Columns 1-11	The first eleven digits from the random number generating subroutine.*

This card should be changed for each machine run. The new eleven digits are to be taken from the last row of the preceding printout following the message, "This is a new series of tests." If scale polarity is not to be varied do not include this card in the data deck.

Cards 3 through 47

The instructions to be printed at the beginning of each questionnaire are contained in these cards. The contents of these cards may be examined card-by-card by referring to the appropriate lines in Appendix E.

Card 48

Concept order for first column of Latin square**

Columns 1 and 2	First concept
Columns 3 and 4	Second concept
.	.
.	.
.	.
.	.
.	.
Columns 2k-1 and 2k (Where $k \leq 22$)	kth concept

*Any random number generating function may be employed by replacing the appropriate cards in the program deck and redesigning Card 2 in the data deck. The algorithm employed here was to reverse the polarity of an adjective pair if the associated random digit was odd.

**See Appendix A for a listing of first columns to be used.

Card 49

Scale order for first column of Latin square*	
Columns 1 and 2	First concept
Columns 3 and 4	Second concept
.	.
.	.
.	.
.	.
.	.
Columns 2k - 1 and 2k	k.th concept
(Where $k \leq 22$)	

Card 50 through (50 + k) , $k \leq 22$

Concept list.	One concept per card beginning in column 1.

Card $\left[(50 + k) + 1\right]$ through $\left[((50 + k) + 1) + k\right]$

Scale list	One scale per card
Columns 1-15	First adjective
Columns 16-30	Second adjective

Last Card

Repeat card 1 for a new series of questionnaires.

While the program was written with SD questionnaires in mind it is quite possible to use it (with a modified data deck) to generate tests or questionnaires of various sorts. For example multiple choice tests may be produced by using the Latin square generating subroutine twice, once for question order and once for alternative order within each question. Lists for matching questions may be varied in the same manner. True-false tests may be printed such that proximity error is minimized. Questionnaires with up to 22^2 items may be produced by this program. It appears that with little or no modification the basic subroutines of the program can be used in a wide range of test or questionnaire production applications.

*See Appendix A for a listing of first columns to be used.

Comparing SD Questionnaire Generating Strategies

The computer program described in the preceding section makes it possible to detect differences in responses attributable to order effects on SD questionnaires. This section reports the results of studying whether or not reducing sources of proximity error changes the response patterns of Ss.

Experimental Design

There are nine SD questionnaire generating strategies. Numbers 1 through 8 comprise all the combinations producible from the computer program; number 9 is the standard non-computer-based format.

1. Concept order fixed, scale order fixed, scale polarity fixed.
2. Concept order fixed, scale order fixed, scale polarity varied.
3. Concept order fixed, scale order varied, scale polarity fixed.
4. Concept order fixed, scale order varied, scale polarity varied.
5. Concept order varied, scale order fixed, scale polarity fixed.
6. Concept order varied, scale order fixed, scale polarity varied
7. Concept order varied, scale order varied, scale polarity fixed.
8. Concept order varied, scale order varied, scale polarity varied.
9. A few concept orders, scale order fixed, polarity fixed.

There are 36 distinct pairs of strategies $({}_9C_2 = \frac{9!}{2!7!})$. Of these 36 pairings three were selected as being of prime importance in determining the utility of reducing proximity error in research employing the SD. The study of each pair is designated as an experiment.

Experiment I: Strategies 1 and 8.
These strategies should produce maximum differences with respect to effects of proximity error. Response differences here may serve as a base line against which to compare differences between other pairs.

Experiment II: Strategies 9 and 8.
These strategies should produce differences comparable to those between SD questionnaires produced in the standard (non-computer-based) way and those produced by employing all the format variability available by using the computer to generate the questionnaires.

Experiment III: Strategies 9 and 2.
This pairing provides a comparison between the non-computerized questionnaire and one in which only scale polarity is varied. If significant differences in response patterns are found within the pairings of Experiments II and III, and if the differences in Experiment II are comparable to those in Experiment III then it would be economically sound to generate SD questionnaires using strategy 2 since it is simpler (thus less costly) than employing strategy 8.

These three experiments were selected because they would afford enough information to be able to decide whether or not reducing proximity error produces differences in the response patterns of Ss on SD questionnaires. If it does, other pairings can be examined as necessary. If it does not, non-computerized production techniques may be used without continuing concern over the presence of proximity error effects.

Subjects and Data Collection

One hundred fifty undergraduate students enrolled in a mathematics course for prospective elementary teachers were selected as Ss. The selection was done randomly from five sections of the course having a total enrollment of 186 students. The remaining 36 students participated in the data collection but their responses were not analyzed. Fifty Ss were assigned randomly to each of the three experiments. Within each experiment twenty-five Ss completed a SD questionnaire generated by one of the strategies while the remaining twenty-five Ss completed a SD questionnaire generated by the other strategy. Assignment of Ss to these treatments was done randomly. Ten days after the first data collection each S completed another SD composed of the same concepts and adjectival scales but generated by the opposing strategy. Thus for each experiment 50 SD's of each type were completed by the Ss.

The design of the data collection is depicted below. R_i denotes the ith group of randomly selected Ss and SD_j denotes an SD constructed according to strategy j.

E_I	R_1 :	SD_1	SD_8
	R_2 :	SD_8	SD_1
E_{II}	R_3 :	SD_9	SD_8
	R_4 :	SD_8	SD_9
E_{III}	R_5 :	SD_9	SD_2
	R_6 :	SD_2	SD_9

The SD Questionnaire

Each SD questionnaire was composed of nine concepts related to major curricular areas in the elementary schools. They were language arts, mathematics, science, social studies, teaching children, teaching children language arts, teaching children mathematics, teaching children science, and teaching children social studies. Each concept was rated on 14 scales: good-bad, nice-awful, positive-negative, heavenly-hellish, optimistic-pessemistic, happy-sad, strong-weak, heavy-light, hard-soft, masculine-feminine, fast-slow, active-passive, hot-cold, and difficult-easy.

Findings and Analysis

Fifty-four (two treatments X 3 experiments X 9 concepts) 14 X 14 matrices of product-moment correlations were computed. Each of these was factored using principal components analysis. Unities were used to estimate communality, and each analysis was followed by an orthogonal rotation to Kaiser's (1958, 1960), Varimax criterion. Linear correlations were justified because no systematic nonmonotonicity was observed among variables in the matrices. While nonlinear relations undoubtedly exist among the variables, a linear correlation model yields a reasonable measure of the degree of relationship for a monotonic relation.

Tables 1-6 list the proportion of total variance accounted for by the set of rotated factors for each analysis.

The Varimax criterion terminated the rotation after two factors in 13 of the 54 analyses, after three factors in 28 cases, and in no case were more than four factors rotated. The proportion of total variance accounted for by the first two factors ranged from 0.452 to 0.820. In only one case did factor III contribute more than 10% of the total variance. When third and fourth factors were rotated they seemed to be reoccurances of heavy loadings on first and second factors. In fact factor IV seemed to be factor II revisited. It was decided to use only factors I and II as data sources for this study.

Three differences between responses to the two types of SD questionnaires were analyzed in each experiment:

1. Differences in rotated factor structure
2. Differences in factor scores concept-by-concept
3. Differences in response consistency.

Each of these will be defined explicitly in its respective section below.

Factor Structure

To determine differences in rotated factor structure among the strategies, scales with factor loadings ≥ 0.30 were listed for factors I and II for each of the 54 rotated factor matrices.* In the case of factor I these data then were compressed by recording only those scales with loadings ≥ 0.30 for eight concepts out of nine. In the case of factor II the criterion for final recording of a scale was set at loadings ≥ 0.30 for seven concepts out of nine. Tables 7 and 8 list the scales which survived these screening processes for factors I and II respectively.

*Recall that there are three experiments, each consisting of two treatments over nine concepts.

Table 1

Proportion of Total Variance for Rotated Factors

Experiment I, Strategy 1

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.449	.120	.087	-	.656
Mathematics	.574	.093	-	-	.667
Science	.567	.104	-	-	.673
Social Studies	.581	.105	-	-	.686
Teaching Children	.474	.130	.087	-	.691
Teaching Children Language Arts	.370	.158	.107	-	.635
Teaching Children Mathematics	.417	.153	.094	-	.664
Teaching Children Science	.519	.149	-	-	.668
Teaching Children Social Studies	.615	.084	-	-	.699

Table 2

Proportion of Total Variance for Rotated Factors

Experiment I, Strategy 8

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.459	.142	.100	-	.701
Mathematics	.532	.134	.073	-	.739
Science	.614	.180	-	-	.794
Social Studies	.544	.110	.085	-	.739
Teaching Children	.530	.119	-	-	.649
Teaching Children Language Arts	.402	.155	.086	.074	.717
Teaching Children Mathematics	.521	.112	.083	-	.716
Teaching Children Science	.462	.125	.087	.072	.746
Teaching Children Social Studies	.528	.100	.084	-	.712

Table 3

Proportion of Total Variance for Rotated Factors

Experiment II, Strategy 9

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.494	.209	.090	-	.693
Mathematics	.555	.084	.078	-	.717
Science	.624	.196	-	-	.840
Social Studies	.502	.111	.078	-	.691
Teaching Children	.396	.121	.095	-	.612
Teaching Children Language Arts	.523	.096	-	-	.619
Teaching Children Mathematics	.415	.122	.077	.072	.686
Teaching Children Science	.530	.104	-	-	.634
Teaching Children Social Studies	.530	.110	.048	-	.718

Table 4

Proportion of Total Variance for Rotated Factors

Experiment II, Strategy 3

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.468	.108	.073	-	.650
Mathematics	.498	.110	.082	-	.690
Science	.572	.194	-	-	.766
Social Studies	.493	.133	.083	-	.711
Teaching Children	.432	.136	.092	.075	.735
Teaching Children Language Arts	.442	.126	.096	.080	.744
Teaching Children Mathematics	.446	.122	.076	.075	.699
Teaching Children Science	.457	.117	.084	-	.661
Teaching Children Social Studies	.475	.107	.098	.074	.744

Table 5

Proportion of Total Variance for Rotated Factors

Experiment III, Strategy 9

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.531	.129	.081	-	.741
Mathematics	.580	.087	-	-	.667
Science	.645	.134	-	-	.779
Social Studies	.534	.104	.077	-	.715
Teaching Children	.537	.106	.078	-	.721
Teaching Children Language Arts	.452	.122	.084	-	.658
Teaching Children Mathematics	.417	.148	.077	-	.642
Teaching Children Science	.461	.121	.091	-	.673
Teaching Children Social Studies	.443	.137	.093	.077	.750

Table 6

Proportion of Total Variance for Rotated Factors

Experiment III, Strategy 2

Concept	Factors				
	I	II	III	IV	CUM
Language Arts	.476	.111	.100	-	.687
Mathematics	.536	.094	.078	-	.708
Science	.573	.175	-	-	.748
Social Studies	.428	.098	.094	.078	.699
Teaching Children	.440	.116	.090	.072	.718
Teaching Children Language Arts	.440	.109	.080	-	.629
Teaching Children Mathematics	.304	.148	.126	.104	.682
Teaching Children Science	.449	.095	.076	-	.620
Teaching Children Social Studies	.398	.140	.095	.078	.712

Table 7

Scales With Factor I Loadings $\geq$ 0.30 In

At Least 45 out of 54 Cases

	Questionnaire Generating Strategy			
	1	2	8	9
heavy-light				
active-passive	X		X	X
happy-sad*	X	X	X	X
heavenly-hellish*	X	X		X
fast-slow	X			
positive-negative*	X	X	X	X
difficult-easy				
optimistic-pessimistic*	X		X	X
strong-weak	X	X	X	X
hard-soft				
nice-awful*	X	X	X	X
hot-cold	X		X	
good-bad*	X	X	X	X
masculine-feminine				

*Denotes scales traditionally associated with factor I in SD research.

Table 8

Scales With Factor II Loadings $\geq$ 0.30 In

At Least 36 Out of 54 Cases

	Questionnaire Generating Strategy			
	1	2	8	9
heavy-light	X	X	X	X
active-passive				
happy-sad				
heavenly-hellish	X			
fast-slow				
positive-negative				
difficult-easy	X	X	X	X
optimistic-pessimistic				
strong-weak				
hard-soft	X	X	X	X
nice-awful	X			
hot-cold				
good-bad				
masculine-feminine				

In Table 7 there are 56 (i.e., 4 strategies X 14 scales) cells in which a tally mark can appear. By changing the entry in just six of these cells identical matchings could be created in all four strategy columns. Indeed, identical markings already exist for nine of the 14 scales. Of the six traditional factor I scales, four survived the screening procedure under all four strategies; the remaining two survived under three out of four strategies. Although the strategy 2 column exhibits the greatest deviation from the other columns, Table 7 argues on the side of marked similarities among the columns rather than marked differences.

By changing only two entries out of 56 in Table 8 matchings in all four strategy columns could be created. With the possible exception of factor I, strategy 2, there seems to be no appreciable differences in factor structure among the four questionnaire generating strategies for either factor I or factor II.

Factor-Scores

On the basis of the factor structure summarized in Tables 7 and 8 five scales were chosen to represent factor I and three scales were chosen to represent factor II. For factor I the scales selected were happy-sad, positive-negative, strong-weak, nice-awful, and good-bad. For factor II the scales were heavy-light, difficult-easy, and hard-soft.

A score from 0 to 6 was recorded for each S on each scale and a mean score on factor I scales as well as factor II scales was computed concept-by-concept within each experimental treatment. Thus within each experiment there were nine pairs of mean scores for factor I and nine pairs of mean scores for factor II. Each pair contained two mean scores for a given concept one of which arose from SD questionnaires generated by one strategy while the other came from SD questionnaires generated by the opposing strategy. The difference between mean scores within each pair was analyzed by an analysis of variance model.

Tables 9-11 list the F ratios emanating from experiments I, II, and III respectively.

Table 9

F Ratios for ANOVAs: Experiment I

(Strategy 1 vs. Strategy 8)

Concept	Factor I	Factor II
Language Arts	1.810	0.844
Mathematics	1.881	1.715
Science	0.051	0.717
Social Studies	2.843*	0.524
Teaching Children	0.746	1.246
Teaching Children Language Arts	0.346	0.280
Teaching Children Mathematics	0.945	0.000
Teaching Children Science	0.026	0.006
Teaching Children Social Studies	0.377	0.006

* Significant at $\alpha = 0.10$. None of these F ratios is significant at $\alpha = 0.05$.

Table 10

F Ratios for ANOVAs: Experiment II

(Strategy 8 vs. Strategy 9)

Concept	Factor I	Factor II
Language Arts	0.258	0.067
Mathematics	0.508	0.197
Science	0.646	1.449
Social Studies	1.114	0.829
Teaching Children	2.173	2.767*
Teaching children Language Arts	0.580	1.294
Teaching Children Mathematics	0.256	0.375
Teaching Children Science	0.007	0.401
Teaching Children Social Studies	0.098	0.181

* Significant at $\alpha = 0.10$. None of these F ratios is significant at $\alpha = 0.05$.

Table 11

F Ratios for ANOVAs: Experiment III

(Strategy 2 vs. Strategy 9)

Concept	Factor I	Factor II
Language Arts	0.064	0.418
Mathematics	0.039	0.146
Science	0.602	0.054
Social Studies	0.050	0.336
Teaching Children	0.008	0.803
Teaching Children Language Arts	0.330	1.200
Teaching Children Mathematics	0.788	2.863*
Teaching Children Science	0.002	1.126
Teaching Children Social Studies	0.792	1.774

* Significant at $\alpha = 0.10$. None of these F ratios is significant at $\alpha = 0.05$.

Of the 54 F ratios displayed in Tables 9-11, none is significant at the $\alpha = 0.05$ level; only three are significant at the $\alpha = 0.10$. In fact only six more are significant when the α-level is advanced to 0.25. Forty of the 54 F ratios are less than 1.000. These data suggest that no systematic differences in factor scores occur in any of the experiments.

Response Consistency

As a final reading of the differences between strategies a direct measure designated "response consistency" was devised. This measure seeks to answer the following question: How closely does S's response on the (n + k)th adjective scale conform to his response on the nth adjective scale? To answer this question the absolute value of the difference between the score on scale n and scale n + k was selected as the measure. Thus $C = \frac{\sum |s_n - s_{n+k}|}{14-k}$, where C denotes a response consistency index, s_n denotes the score on scale n, s_{n+k} denotes the score on scale (n + k), and $|s_n - s_{n+k}|$ is summed over all such differences within a given concept. Clearly, the summation could be made of all such differences produced by a given S across concepts if one wished to do so. Summing within concepts and across Ss was done to conform with the other analyses made in this study. It was decided to let k = 1, 2, 3, or 4. Thus four distinct C's were computed for each concept. When k = 1, differences between scores for adjacent scales are involved. Since there were 14 scales in all, 13 difference scores are accumulated for each S on each concept. When k = 2, differences between scores on scales 1 and 3, 2 and 4, ..., 12 and 14 are accumulated. In this case there are 12 difference scores for each S on each concept. Similarly, when k = 3, there are 11 difference scores per concept per S and when k = 4, there are 10 difference scores per concept per S.
By using 14-k in the denominator the four response consistency measures are transfered into comparable indices.

If the basic hypothesis of proximity error effects is operative then we can assume that differences when k = 1 should be less than differences when k = 2 and, in general $C_1 < C_2 < C_3 < C_4$, where the subscript digits refer to the value for k. Table 12 displays response consistency indices for k= 1, 2, 3, and 4 for each concept from 200 of the SD questionnaires completed by Ss in this study.

Table 12

Response Consistency Indices from

200 SD Questionnaires

k	Language Arts	Mathematics	Science	Social Studies	Teaching Children	Teaching Children Language Arts	Teaching Children Mathematics	Teaching Children Science	Teaching Children Social Studies
1	356.2	356.8	266.2	332.7	399.2	355.1	312.2	313.1	328.7
2	331.6	364.3	274.5	317.5	339.1	317.3	311.8	304.7	294.0
3	328.2	342.0	266.4	299.4	348.6	318.0	312.1	297.8	302.8
4	358.3	357.1	272.3	331.6	351.3	348.0	316.6	315.7	328.5

An inspection of the nine columns of Table 12 does not support the existance of the order relation.

$$C_1 < C_2 < C_3 < C_4.$$

In four out of nine columns C_1 is the largest of the entries. In three out of nine columns C_4 is the largest of the entries. In order to determine whether row or columnar differences are significant a two-way analysis of variance was performed. Table 13 includes the relevant data.

Table 13

ANOVA for Comparing Four

Response Consistency Indices Across

Nine SD Concepts for 200 SD Questionnaires

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Response Consistency Indices for k = 1, 2, 3, and 4	14.12	3	4.71	10.5*
Concepts	116.58	8	14.57	32.4*
Interaction	11.01	24	0.46	1.0
Within Cells	3251.88	7164	0.45	

* Significant at $\alpha = 0.01$

The inequality of the indices across concepts suggests that the magnitude of the response consistency indices is related to the concept being rated. While the F ratio associated with within-column differences suggests that $C_1 \neq C_2 \neq C_3 \neq C_4$, no systematic order relation among C_1, C_2, C_3, and C_4 was observed. The fact that C_4 is always first or second in size and that C_3 is always third or fourth in size is the only consistent pattern of note among the columnar entries in Table 12. There is no evidence of concept-index interaction. Thus while there are differences in response consistency these differences do not appear to be interpretable as indicators of proximity error effects based on adjective scale presentation order with the SD concepts and scales used in this research.

Conclusions and Recommendations

Responses to a SD consisting of nine concepts each rated on 14 scales were analyzed to determine whether or not differences attributable to order effects are discernable. The basic question was: Does reducing sources of proximity error change the response patterns of Ss? Three experiments were conducted. Each one compared responses of Ss to two computer generated forms of a SD. In Experiment I one form of the SD minimized order effects by varying concept order, scale order, and the order of adjective presentation within a scale while the alternate form held each of these orders fixed. In Experiment II one form of the SD varied all three orderings while the alternative form held scale order and adjective order within scales fixed but presented the nine concepts in four different orders each determined randomly. In Experiment III one form of the SD had fixed concept and scale orders while adjective order within scales was varied while the other form exhibited fixed scale and within scale adjective orders but offered four different concept orders each determined randomly.

One hundred fifty Ss were selected at random from a population of 186 prospective elementary teachers enrolled in a mathematics course. Assignment of Ss to experiments and treatment groups within experiments was done randomly.

In each experiment three ways in which responses might differ were analyzed. These included differences in the rotated factor structures of the SD data, differences in factor scores concept-by-concept, and differences among indices of response consistency. The results from all three ways of searching for differences due to order effects were unequivocal.

a. There were no appreciable differences in factor structure among the four SD questionnaire forms for factors I and II (the only factors analyzed).

b. There were no significant differences in factor scores for factors I and II between opposing SD questionnaire formats in any of the three experiments.

c. The differences in response consistency indices do not seem to be interpretable as indicators of item order effects.

In short, this research supplied no evidence that users of the SD need to be concerned about item order effects as a significant source of error variance. In Experiment I, where one treatment invited maximum order effects and the other treatment minimized the sources of these effects from all three orderings (concept order, scale order and adjective order within scales) no significant response differences were observed. In Experiments II and III, where the opposing SD formats were less profoundly different, the same result obtained.

Subject to the usual constraints on the generalizableness of findings it appears that Es may cease worrying about the effects of a constant item presentation ordering when administering the SD. The effect of using a modification of the computer program described in the first section of this report to reduce proximity error with other types of questionnaires and tests remains to be assessed.

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Appendix A

An heuristic strategy was employed by Houston (1967) in using a computer to search for a permutation of k items such that the k X k cyclic Latin square generated by the permutation minimized proximity error in a test containing k items. The best permutations for k = 2, 3, ..., 15, 16, 17, 18, 20, 22 found by this procedure are reproduced below.

k	Permutation
2	(0, 1)
3	(0, 1, 2)
4	(0, 1, 3, 2)
5	(0, 1, 3, 2, 4)
6	(0, 1, 4, 2, 3, 5)
7	(0, 1, 3, 6, 4, 5, 2)
8	(0, 1, 5, 3, 2, 7, 4, 6)
9	(0, 1, 4, 6, 2, 3, 8, 5, 7)
10	(0, 3, 8, 2, 9, 7, 6, 4, 5, 1)
11	(0, 1, 9, 7, 3, 8, 4, 2, 10, 5, 6)
12	(0, 1, 8, 2, 10, 7, 5, 4, 9, 11, 3, 6)
13	(0, 1, 3, 8, 12, 9, 5, 11, 6, 7, 10, 4, 2)
14	(0, 2, 1, 8, 5, 10, 6, 12, 13, 3, 11, 9, 4, 7)
15	(0, 4, 1, 2, 7, 9, 12, 13, 6, 8, 14, 3, 11, 5, 10)
16	(0, 4, 2, 1, 10, 7, 9, 14, 5, 15, 11, 3, 6, 12, 13, 8)
17	(0, 3, 14, 13, 9, 2, 4, 6, 11, 10, 1, 15, 5, 16, 8, 12, 7)
18	(0, 2, 16, 14, 11, 3, 8, 17, 7, 6, 13, 1, 12, 15, 10, 4, 5, 9)
20	(0, 15, 8, 9, 3, 11, 7, 13, 17, 2, 12, 4, 6, 5, 14, 1, 18, 16, 19, 10)
22	(0, 2, 16, 5, 13, 4, 10, 17, 12, 8, 6, 9, 3, 7, 19, 18, 15, 20,21, 14, 1, 11)

Appendix B

This appendix consists of a facsimile of a SD questionnaire produced by a computer. The questionnaire has concept order, scale order, and scale polarity all varied. Thus successive questionnaires from this production run were produced with different concept orders.

THE PURPOSE OF THIS STUDY IS TO MEASURE THE MEANINGS OF CERTAIN THINGS TO VARI OUS PECPLE BY HAVING THEM JUDGE THEM AGAINST A SERIES OF DESCRIPTIVE SCALES. IN TAKING THIS TEST, PLEASE MAKE YOUR JUDGEMENTS OF THE BASIS OF WHAT THESE TH INGS MEAN TC YOU. ON EACH PAGE OF THIS BCOKLET YCU WILL FIND A DIFFERENT CONC EPI TC BE JUDGED AND BENEATH IT A SET OF SCALES. YOU ARE TO RATE THE CONCEPT ON EACH OF THESES SCALES IN ORDER. HERE IS HCW YCU ARE TO USE THESE SCALES. IF TOL FEEL THAT THE CONCEPT AT THE TOP OF THIS PAGE IS VERY CLOSELY RELATED TO CNE ENC CF THE SCALE, YOU SHOULD PLACE YOUR CHECK MARK AS FOLLOWS

FAIR X / / / / / / UNFAIR

OR FAIR / / / / / / X UNFAIR

IF YOL FEEL THAT THE CONCEPT IS QUITE CLOSELY RELATED TO ONE OR THE OTHER END OF THE SCALE (BUT NCT EXTREMELY), YOU SHOULD PLACE YOUR MARK AS FOLLOWS

STRCNG / X / / / / / WEAK

OR STRCNG / / / / / X / WEAK

IF THE CCNCEPT SEEMS CNLY SLIGHTLY RELATED TO ONE SIDE AS OPPOSED TO THE CTHER SIDE (BUT IS NCT REALLY NEUTRAL), THEN YOU SHOULD CHECK AS FOLLOWS

ACTIVE / / X / / / / PASSIVE

OR ACTIVE / / / / X / / PASSIVE

THE DIRECTICN TCWARD WHICH YOU CHECK (OF COURSE) CEPENDS UPON WHICH OF THE TWO ENDS CF THE SCALE SEEM MOST CHARACTERISTIC OF THE THING YOU ARE JUDGING. IF YOL CCNSIDER THE CCNCEPT TO BE NEUTRAL ON THE SCALE, BOTH SIDES OF THE SCALE EQUALLY ASSOCIATED WITH THE CONCEPT, OR IF THE SCALE IS COMPLETELY IRREVELENT , UNRELATED TO THE CONCEPT, THEN YOU SHOULD MARK THE SCALE AS FOLLOWS

SAFE / / / X / / / DANGEROUS

IMPORTANT (1) PLACE YOUR CHECK MARKS IN THE MIDDLE OF THE SPACES. NOT ON THE BOUNDRIES / / X /

(2) BE SURE YOU CHECK EVERY SCALE FOR EVERY CONCEPT DO NOT OMIT ANY

(3) NEVER PUT MORE THAN ONE CHECK MARK ON A SINGLE SCALE.

SOMETIMES YOU MAY FEEL AS THOUGH YOU HAVE HAD THE SAME ITEM BEFORE ON THE TEST. THIS WILL NOT BE THE CASE, SO DO NOT LOOK BACK AND FORTH THROUGH THE ITEMS. DO NOT TRY TO REMEMBER HOW YOU CHECKED SIMILAR ITEMS EARLIER IN THE TEST. DO NOT WORRY OR PUZZLE OVER INDIVIDUAL ITEMS. IT IS YOUR FIRST IMPRESSIONS, THE IMMEDIATE FEELINGS ABOUT THE ITEMS, THAT WE WANT. ON THE OTHER HAND PLEASE DO NOT BE CARELESS, BECAUSE WE WANT YOUR TRUE IMPRESSIONS.

TEACHING CHILDREN MATHEMATICS

ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
HAPPY	/----/----/----/----/----/----/----/	SAD
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
BAD	/----/----/----/----/----/----/----/	GOOD
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
FEMININE	/----/----/----/----/----/----/----/	MASCULINE
SLOW	/----/----/----/----/----/----/----/	FAST
HEAVY	/----/----/----/----/----/----/----/	LIGHT
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
AWFUL	/----/----/----/----/----/----/----/	NICE
HARD	/----/----/----/----/----/----/----/	SOFT
HOT	/----/----/----/----/----/----/----/	COLD
EASY	/----/----/----/----/----/----/----/	DIFFICULT
WEAK	/----/----/----/----/----/----/----/	STRONG

SCCIAL STUDIES

PCSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
AWFLL	/----/----/----/----/----/----/----/	NICE
HAPPY	/----/----/----/----/----/----/----/	SAD
HCT	/----/----/----/----/----/----/----/	COLD
FAST	/----/----/----/----/----/----/----/	SLOW
HARC	/----/----/----/----/----/----/----/	SOFT
WEAK	/----/----/----/----/----/----/----/	STRONG
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
CIFFICLLT	/----/----/----/----/----/----/----/	EASY
HEAVY	/----/----/----/----/----/----/----/	LIGHT
FEMININE	/----/----/----/----/----/----/----/	MASCLLINE
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
BAC	/----/----/----/----/----/----/----/	GOOD

TEACHING CHILDREN

SAD	/----/----/----/----/----/----/----/	HAPPY
EASY	/----/----/----/----/----/----/----/	DIFFICULT
AWFLL	/----/----/----/----/----/----/----/	NICE
MASCULINE	/----/----/----/----/----/----/----/	FEMININE
STRONG	/----/----/----/----/----/----/----/	WEAK
LIGHT	/----/----/----/----/----/----/----/	HEAVY
GOOD	/----/----/----/----/----/----/----/	BAD
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
HARD	/----/----/----/----/----/----/----/	SOFT
FAST	/----/----/----/----/----/----/----/	SLOW
COLD	/----/----/----/----/----/----/----/	HOT

TEACHING CHILDREN SOCIAL STUDIES

AWFLL	/----/----/----/----/----/----/----/	NICE
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
EASY	/----/----/----/----/----/----/----/	DIFFICULT
HARD	/----/----/----/----/----/----/----/	SOFT
GOOD	/----/----/----/----/----/----/----/	BAD
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
HOT	/----/----/----/----/----/----/----/	COLD
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
HAPPY	/----/----/----/----/----/----/----/	SAD
FAST	/----/----/----/----/----/----/----/	SLOW
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
HEAVY	/----/----/----/----/----/----/----/	LIGHT
STRONG	/----/----/----/----/----/----/----/	WEAK
MASCULINE	/----/----/----/----/----/----/----/	FEMININE

LANGUAGE ARTS

DIFFICULT	/----/----/----/----/----/----/----/	EASY
FAST	/----/----/----/----/----/----/----/	SLOW
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
LIGHT	/----/----/----/----/----/----/----/	HEAVY
HOT	/----/----/----/----/----/----/----/	COLD
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
FEMININE	/----/----/----/----/----/----/----/	MASCULINE
SAD	/----/----/----/----/----/----/----/	HAPPY
AWFUL	/----/----/----/----/----/----/----/	NICE
STRONG	/----/----/----/----/----/----/----/	WEAK
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
BAD	/----/----/----/----/----/----/----/	GOOD
HARD	/----/----/----/----/----/----/----/	SOFT

MATHEMATICS

HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
STRONG	/----/----/----/----/----/----/----/	WEAK
FAST	/----/----/----/----/----/----/----/	SLOW
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
FEMININE	/----/----/----/----/----/----/----/	MASCULINE
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
SOFT	/----/----/----/----/----/----/----/	HARD
NICE	/----/----/----/----/----/----/----/	AWFUL
DIFFICULT	/----/----/----/----/----/----/----/	EASY
GOOD	/----/----/----/----/----/----/----/	BAD
SAD	/----/----/----/----/----/----/----/	HAPPY
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
COLD	/----/----/----/----/----/----/----/	HOT
LIGHT	/----/----/----/----/----/----/----/	HEAVY

SCIENCE

FAST	/----/----/----/----/----/----/----/	SLOW
BAD	/----/----/----/----/----/----/----/	GOOD
STRONG	/----/----/----/----/----/----/----/	WEAK
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
HARD	/----/----/----/----/----/----/----/	SOFT
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVY	/----/----/----/----/----/----/----/	LIGHT
EASY	/----/----/----/----/----/----/----/	DIFFICULT
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
HOT	/----/----/----/----/----/----/----/	COLD
AWFUL	/----/----/----/----/----/----/----/	NICE
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
FEMININE	/----/----/----/----/----/----/----/	MASCULINE
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC

WEAK	/----/----/----/----/----/----/----/	STRONG
COLD	/----/----/----/----/----/----/----/	HOT
GOOD	/----/----/----/----/----/----/----/	BAD
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
LIGHT	/----/----/----/----/----/----/----/	HEAVY
NICE	/----/----/----/----/----/----/----/	AWFUL
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
FAST	/----/----/----/----/----/----/----/	SLOW
MASCULINE	/----/----/----/----/----/----/----/	FEMININE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
HAPPY	/----/----/----/----/----/----/----/	SAD
HARD	/----/----/----/----/----/----/----/	SOFT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE

TEACHING CHILDREN LANGUAGE ARTS

GOOD	/----/----/----/----/----/----/----/	BAD
MASCULINE	/----/----/----/----/----/----/----/	FEMININE
COLD	/----/----/----/----/----/----/----/	HOT
SAD	/----/----/----/----/----/----/----/	HAPPY
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
EASY	/----/----/----/----/----/----/----/	DIFFICULT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SLOW	/----/----/----/----/----/----/----/	FAST
STRONG	/----/----/----/----/----/----/----/	WEAK
SOFT	/----/----/----/----/----/----/----/	HARD
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
NICE	/----/----/----/----/----/----/----/	AWFUL
HEAVY	/----/----/----/----/----/----/----/	LIGHT
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE

Appendix C

This facsimile SD questionnaire has scale polarity varied while concept order and scale order are fixed.

THE PURPOSE OF THIS STUDY IS TO MEASURE THE MEANINGS OF CERTAIN THINGS TO VARI OUS PECPLE BY HAVING THEM JUDGE THEM AGAINST A SERIES OF DESCRIPTIVE SCALES. IN TAKING THIS TEST, PLEASE MAKE YOUR JUDGEMENTS CF THE BASIS OF WHAT THESE TH INGS MEAN TC YOU. ON EACH PAGE OF THIS BCOKLET YOU WILL FIND A DIFFERENT CONC EPT TC BE JUDGED AND BENEATH IT A SET OF SCALES. YOU ARE TO RATE THE CONCEPT CN EACH OF THESES SCALES IN ORDER. HERE IS HCW YOU ARE TO USE THESE SCALES. IF TOU FEEL THAT THE CONCEPT AT THE TOP OF THIS PAGE IS VERY CLOSELY RELATED TO CNE END CF THE SCALE, YOU SHOULD PLACE YOUR CHECK MARK AS FOLLOWS

FAIR X / / / / / / UNFAIR

OR FAIR / / / / / / X UNFAIR

IF YOU FEEL THAT THE CONCEPT IS QUITE CLOSELY RELATED TO ONE OR THE OTHER END OF THE SCALE (BUT NCT EXTREMELY), YOU SHOULC PLACE YOUR MARK AS FOLLOWS

STRCNG / X / / / / / WEAK

OR STRCNG / / / / / X / WEAK

IF THE CONCEPT SEEMS CNLY SLIGHTLY RELATED TO ONE SIDE AS OPPOSED TO THE OTHER SIDE (BUT IS NCT REALLY NEUTRAL), THEN YOU SHOULD CHECK AS FOLLOWS

ACTIVE / / X / / / / PASSIVE

OR ACTIVE / / / / X / / PASSIVE

THE DIRECTICN TOWARD WHICH YOU CHECK (OF COURSE) CEPENDS UPON WHICH OF THE TWO ENDS CF THE SCALE SEEM MOST CHARACTERISTIC OF THE THING YOU ARE JUDGING. IF YOU CCNSIDER THE CCNCEPT TO BE NEUTRAL ON THE SCALE, BOTH SIDES OF THE SCALE EQUALLY ASSOCIATED WITH THE CONCEPT, OR IF THE SCALE IS COMPLETELY IRREVELENT , UNRELATEC TO THE CONCEPT, THEN YOU SHOULD MARK THE SCALE AS FOLLOWS

SAFE / / / X / / / DANGEROUS

IMPCRTANT (1) PLACE YOUR CHECK MARKS IN THE MIDDLE OF THE SPACES, NOT ON THE BOUNDRIES / / X /

(2) BE SURE YOU CHECK EVERY SCALE FOR EVERY CONCEPT DO NOT OMIT ANY

(3) NEVER PUT MORE THAN ONF CHECK MARK ON A SINGLE SCALE.

SCMETIMES YOU MAY FEEL AS THOUGH YCU HAVE HAC THE SAME ITEM BEFORE ON THF TEST. THIS WILL NOT BE THE CASE, SO DO NOT LOOK BACK AND FORTH THROUGH THE ITEMS. DC NOT TRY TC REMEMBER HCW YOU CHECKEC SIMILAR ITEMS EARLIER IN THE TEST. DO NOT WORRY CR PUZZLE OVER INDIVIDUAL ITEMS. IT IS YOUR FIRST IMPRESSI ONS, THE IMMEDIATE FEELINGS ABOUT THE ITEMS, THAT WE WANT. ON THE OTHER HAND PLEASE DO NCT BE CARELESS, BECAUSE WE WANT YOUR TRUE IMPRESSIONS.

SOCIAL STUDIES

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
FAST	/----/----/----/----/----/----/----/	SLOW
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
EASY	/----/----/----/----/----/----/----/	DIFFICULT
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
SOFT	/----/----/----/----/----/----/----/	HARD
AWFUL	/----/----/----/----/----/----/----/	NICE
COLD	/----/----/----/----/----/----/----/	HOT
GOOD	/----/----/----/----/----/----/----/	BAD
MASCULINE	/----/----/----/----/----/----/----/	FEMININE

MATHEMATICS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
FAST	/----/----/----/----/----/----/----/	SLOW
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
EASY	/----/----/----/----/----/----/----/	DIFFICULT
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
SOFT	/----/----/----/----/----/----/----/	HARD
AWFUL	/----/----/----/----/----/----/----/	NICE
HOT	/----/----/----/----/----/----/----/	COLD
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN MATHEMATICS

LIGHT	/----/----/----/----/----/----/----/	HEAVY
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
FAST	/----/----/----/----/----/----/----/	SLOW
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
EASY	/----/----/----/----/----/----/----/	DIFFICULT
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
SOFT	/----/----/----/----/----/----/----/	HARD
NICE	/----/----/----/----/----/----/----/	AWFUL
HOT	/----/----/----/----/----/----/----/	COLD
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

LANGUAGE ARTS

LIGHT	/----/----/----/----/----/----/----/	HEAVY
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
FAST	/----/----/----/----/----/----/----/	SLOW
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
SOFT	/----/----/----/----/----/----/----/	HARD
NICE	/----/----/----/----/----/----/----/	AWFUL
COLD	/----/----/----/----/----/----/----/	HOT
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

SCIENCE

HEAVY	/----/----/----/----/----/----/----/	LIGHT
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
HAPPY	/----/----/----/----/----/----/----/	SAD
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
SLOW	/----/----/----/----/----/----/----/	FAST
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARD	/----/----/----/----/----/----/----/	SOFT
NICE	/----/----/----/----/----/----/----/	AWFUL
COLD	/----/----/----/----/----/----/----/	HOT
BAD	/----/----/----/----/----/----/----/	GOOD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN SOCIAL STUDIES

LIGHT	/----/----/----/----/----/----/----/	HEAVY
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
HAPPY	/----/----/----/----/----/----/----/	SAD
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
SLOW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
HARD	/----/----/----/----/----/----/----/	SOFT
NICE	/----/----/----/----/----/----/----/	AWFUL
HOT	/----/----/----/----/----/----/----/	COLD
BAD	/----/----/----/----/----/----/----/	GOOD
FEMININE	/----/----/----/----/----/----/----/	MASCLLINE

TEACHING CHILDREN

LIGHT	/----/----/----/----/----/----/----/	HEAVY
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HELLISH	/----/----/----/----/----/----/----/	HEAVENLY
SLOW	/----/----/----/----/----/----/----/	FAST
POSITIVE	/----/----/----/----/----/----/----/	NEGATIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
HARD	/----/----/----/----/----/----/----/	SOFT
NICE	/----/----/----/----/----/----/----/	AWFUL
COLD	/----/----/----/----/----/----/----/	HOT
BAD	/----/----/----/----/----/----/----/	GOOD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN SCIENCE

LIGHT	/----/----/----/----/----/----/----/	HEAVY
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
HAPPY	/----/----/----/----/----/----/----/	SAD
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
FAST	/----/----/----/----/----/----/----/	SLOW
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
EASY	/----/----/----/----/----/----/----/	DIFFICULT
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
SOFT	/----/----/----/----/----/----/----/	HARD
AWFUL	/----/----/----/----/----/----/----/	NICE
HOT	/----/----/----/----/----/----/----/	COLD
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN LANGUAGE ARTS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
PASSIVE	/----/----/----/----/----/----/----/	ACTIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
FAST	/----/----/----/----/----/----/----/	SLOW
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
EASY	/----/----/----/----/----/----/----/	DIFFICLLT
PESSIMISTIC	/----/----/----/----/----/----/----/	OPTIMISTIC
STRONG	/----/----/----/----/----/----/----/	WEAK
HARD	/----/----/----/----/----/----/----/	SOFT
NICE	/----/----/----/----/----/----/----/	AWFUL
COLC	/----/----/----/----/----/----/----/	HOT
BAC	/----/----/----/----/----/----/----/	GOOD
FEMININE	/----/----/----/----/----/----/----/	MASCLLINE

Appendix D

Although this SD questionnaire was computer generated, all sources of order effects were fixed. That is, concept order, scale order, and scale polarity are constant throughout the production run.

THE PURPOSE OF THIS STUDY IS TO MEASURE THE MEANINGS OF CERTAIN THINGS TO VARI OUS PECPLE BY HAVING THEM JUDGE THEM AGAINST A SERIES OF DESCRIPTIVE SCALES. IN TAKING THIS TEST, PLEASE MAKE YOUR JUDGEMENTS OF THE BASIS OF WHAT THESE TH INGS MEAN TC YOU. ON EACH PAGE OF THIS BCOKLET YOU WILL FIND A DIFFERENT CONC EPT TC BE JUDGED AND BENEATH IT A SET OF SCALES. YOU ARE TO RATE THE CONCEPT ON EACH OF THESES SCALES IN ORDER. HERE IS HOW YOU ARE TO USE THESE SCALES. IF TOU FEEL THAT THE CONCEPT AT THE TOP OF THIS PAGE IS VERY CLOSELY RELATED TO CNE END CF THE SCALE, YOU SHOULD PLACE YOUR CHECK MARK AS FOLLOWS

FAIR X / / / / / / UNFAIR

OR FAIR / / / / / / X UNFAIR

IF YOU FEEL THAT THE CONCEPT IS QUITE CLOSELY RELATED TO ONE OR THE OTHER END OF THE SCALE (BUT NCT EXTREMELY), YOU SHOULD PLACE YOUR MARK AS FOLLOWS

STRCNG / X / / / / / WEAK

OR STRCNG / / / / / X / WEAK

IF THE CCNCEPT SEEMS CNLY SLIGHTLY RELATED TO ONE SIDE AS OPPOSED TO THE CTHER SIDE (BUT IS NCT REALLY NEUTRAL), THEN YOU SHOULD CHECK AS FOLLOWS

ACTIVE / / X / / / / PASSIVE

OR ACTIVE / / / / X / / PASSIVE

THE DIRECTICN TOWARD WHICH YOU CHECK (OF COURSE) DEPENDS UPON WHICH OF THE TWO ENDS CF THE SCALE SEEM MOST CHARACTERISTIC OF THE THING YOU ARE JUDGING. IF YOU CCNSIDER T:E CCNCEPT TO BE NEUTRAL ON THE SCALE, BOTH SIDES OF THE SCALE EQUALLY ASSOCIATED WITH THE CONCEPT, OR IF THE SCALE IS COMPLETELY IRREVELENT , UNRELATED TO THE CONCEPT, THEN YCU SHOULD MARK THE SCALE AS FOLLOWS

SAFE / / / X / / / DANGEROUS

IMPORTANT (1) PLACE YOUR CHECK MARKS IN THE MIDDLE OF THE SPACES, NOT ON THE BOUNDRIES / / X /

(2) BE SURE YOU CHECK EVERY SCALE FOR EVERY CONCEPT DO NOT OMIT ANY

(3) NEVER PUT MORE THAN ONE CHECK MARK ON A SINGLE SCALE.

SOMETIMES YOU MAY FEEL AS THOUGH YOU HAVE HAD THE SAME ITEM BEFORE ON THE TEST. THIS WILL NOT BE THE CASE, SO DO NOT LOOK BACK AND FORTH THROUGH THE ITEMS. DO NOT TRY TO REMEMBER HOW YOU CHECKED SIMILAR ITEMS EARLIER IN THE TEST. DO NOT WORRY OR PUZZLE OVER INDIVIDUAL ITEMS. IT IS YOUR FIRST IMPRESSIONS, THE IMMEDIATE FEELINGS ABOUT THE ITEMS, THAT WE WANT. ON THE OTHER HAND PLEASE DO NOT BE CARELESS, BECAUSE WE WANT YOUR TRUE IMPRESSIONS.

SOCIAL STUDIES

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLOW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARD	/----/----/----/----/----/----/----/	SOFT
AWFUL	/----/----/----/----/----/----/----/	NICE
COLD	/----/----/----/----/----/----/----/	HOT
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

MATHEMATICS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAD	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLOW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
OPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARD	/----/----/----/----/----/----/----/	SOFT
AWFUL	/----/----/----/----/----/----/----/	NICE
COLD	/----/----/----/----/----/----/----/	HOT
GOOD	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN MATHEMATICS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLOW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
CIFFICLLT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

LANGUAGE ARTS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCh	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
CIFFICLLT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

SCIENCE

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN SOCIAL STUDIES

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
CIFFICLLT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCW	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN SCIENCE

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCh	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICLLT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

TEACHING CHILDREN LANGUAGE ARTS

HEAVY	/----/----/----/----/----/----/----/	LIGHT
ACTIVE	/----/----/----/----/----/----/----/	PASSIVE
SAC	/----/----/----/----/----/----/----/	HAPPY
HEAVENLY	/----/----/----/----/----/----/----/	HELLISH
SLCH	/----/----/----/----/----/----/----/	FAST
NEGATIVE	/----/----/----/----/----/----/----/	POSITIVE
DIFFICULT	/----/----/----/----/----/----/----/	EASY
CPTIMISTIC	/----/----/----/----/----/----/----/	PESSIMISTIC
WEAK	/----/----/----/----/----/----/----/	STRONG
HARC	/----/----/----/----/----/----/----/	SOFT
AWFLL	/----/----/----/----/----/----/----/	NICE
COLC	/----/----/----/----/----/----/----/	HOT
GOCC	/----/----/----/----/----/----/----/	BAD
FEMININE	/----/----/----/----/----/----/----/	MASCULINE

Appendix E

A reproduction of a print out of the computer program developed to control proximity error in SD questionnaires appears in this appendix. Following the program is a reproduced print out of the data deck required to generate the SD questionnaires used in this project.

```
      COMMON JORDER(9,9),IORDER(14,14),ICON(9,80),KSCALE(14,80),
     1KKRN(15),JCON(9,80),JSCALE(14,80),INST(585),I69,J69,POLOP,SCALOP
     2,CONOP,NMBER,FMT1(1),FMT2(1),NUM
      INTEGER CONOP,SCALOP,POLOP
      CALL INOUT(11,0,0)
      READ(5,800) NMBER
  800 FORMAT(I11)
      CALL STORNM(NMBER)
      CALL INOUT(9,0,0)
      NNN=0
      CALL INOUT(6,1,I69)
      DO 27 J=2,I69
      DO 26 I=1,I69
      JORDER(I,J)=JORDER(I,J-1)+1
      IF(JORDER(I,J).GT.I69) GO TO 25
      GO TO 26
   25 JORDER(I,J)=JORDER(I,J)-I69
   26 CONTINUE
   27 CONTINUE
      CALL INOUT(7,1,J69)
      DO 38 J=2,J69
      DO 37 I=1,J69
      IORDER(I,J)=IORDER(I,J-1)+1
      IF(IORDER(I,J).GT.J69) GO TO 36
      GO TO 37
   36 IORDER(I,J)=IORDER(I,J)-J69
   37 CONTINUE
   38 CONTINUE
      CALL INOUT(1,1,I69)
      CALL INOUT(2,1,J69)
      GO TO 955
    1 CALL GETNM(NMBER)
      CALL STORNM(NMBER)
      CALL INOUT(11,0,0)
      NNN=0
  955 WRITE(6,951)NMBER
  951 FORMAT(5X,29HTHIS IS A NEW SERIES OF TESTS,5X,I11//)
      M=0
      J=0
  208 IF(CONOP.EQ.1) GO TO 521
      J=J+1
      IF (J.EQ.I69+1) CALL RANSEL(I69,0,$331)
      IF(CONOP.NE.1) GO TO 211
  521 J=1
  211 DO 304 I=1,I69
      IF(I.EQ.1) CALL INOUT(10,0,0)
      L=JORDER(I,J)
      CALL INOUT(8,L,80)
      IF(SCALOP.EQ.1) GO TO 510
      M=M+1
      IF(M.EQ.J69+1) CALL RANSEL(14,0,$320)
      IF(SCALOP.NE.1) GO TO 217
  510 M=1
  217 CALL RANSEL(J69,2,$320)
      DO 303 K=1,J69
      KL=IORDER(K,M)
```

```
      IF(POLOP.EQ.1) CALL INOUT(4,0,KL)
      IF(POLOP.EQ.1) GO TO 303
      N=KKRN(K)-2
      GO TO 611
  610 N=N-2
  611 IF(N)235,239,610
  239 CALL INOUT(4,0,KL)
      GO TO 303
  235 CALL INOUT(5,0,KL)
  303 CONTINUE
      GO TO 304
  320 DO 325 J11=1,J69
      JL=KKRN(J11)
      DO 324 J12=1,80
  324 JSCALE(J11,J12)=KSCALE(JL,J12)
  325 CONTINUE
      DO 330 J13=1,J69
      DO 328 J14=1,80
  328 KSCALE(J13,J14)=JSCALE(J13,J14)
  330 CONTINUE
      M=1
      GO TO 217
  304 CONTINUE
      NNN=NNN+1
      IF(NNN.GT.NUM) GO TO 1
      GO TO 208
  331 DO 335 J15=1,I69
      NL=KKRN(J15)
      DO 334 J16=1,80
  334 JCON(J15,J16)=ICON(NL,J16)
  335 CONTINUE
      DO 339 J18=1,I69
      DO 338 J19=1,80
  338 ICON(J18,J19) = JCON(J18,J19)
  339 CONTINUE
      J=1
      GO TO 211
      END
$IBFTC INOUTX
      SUBROUTINE INOUT(N,JFK,JKK)
      COMMON JORDER(9,9),IORDER(14,14),ICON(9,80),KSCALE(14,80),
     1KKRN(15),JCON(9,80),JSCALE(14,80),INST(585),I69,J69,POLOP,SCALOP
     2,CONOP,NMBER,FMT1(1),FMT2(1),NUM
      GO TO (600,602,604,605,606,607,609,611,613,615,616),N
  600 DO 601 I=JFK,JKK
      READ(5,100)(ICON(I,J),J=1,80)
  601 CONTINUE
      RETURN
  602 DO 603 I=JFK,JKK
  603 READ(5,102)(KSCALE(I,J),J=1,30)
      RETURN
  604 WRITE(6,103)(ICON(JFK,I),I=1,80)
      RETURN
  605 WRITE(6,104)    (KSCALE(JKK,I),I=1,15),(KSCALE(JKK,I),I=16,30)
      RETURN
  606 WRITE(6,104)(KSCALE(JKK,I),I=16,30),(KSCALE(JKK,I),I=1,15)
      RETURN
  607 READ(5,FMT1)(JORDER(I,1),I=JFK,JKK)
      RETURN
  609 READ(5,FMT2)(IORDER(I,1),I=JFK,JKK)
      RETURN
```

```
  611 WRITE(6,107)(ICON(JFK,J),J=1,JKK)
      RETURN
  613 READ(5,108)(INST(I),I=1,585)
      RETURN
  615 WRITE(6,111)
      WRITE(6,109)(INST(I),I=1,585)
      RETURN
  616 READ(5,110)CONOP,SCALOP,POLOP,NUM,I69,J69,FMT1,FMT2
      RETURN
  100 FORMAT(80A1)
  102 FORMAT(30A1)
  103 FORMAT(80A1)
  104 FORMAT(//5X,15A1,7(5H/----),1H/,5X,15A1)
  107 FORMAT(1H1,//15X,80A1,///)
  108 FORMAT(13A6)
  109 FORMAT(2X,13A6/)
  110 FORMAT(6I3,2A6)
  111 FORMAT(1H1)
      END
$IBFTC RANDOM
      SUBROUTINE RANSEL(IR,IRR,*)
      COMMON JORDER(9,9),IORDER(14,14),ICON(9,80),KSCALE(14,80),
     1KKRN(15),JCON(9,80),JSCALE(14,80),INST(585),I69,J69,POLOP,SCALOP,
     2CONOP,NMBER,FMT1(1),FMT2(1),NUM
      DO 441 I=1,IR
  404  Y=FLRAN(X)
      A=ABS(Y)
      KKL =A*100.
      IF (KKL.EQ.0) GO TO 404
      IF(KKL.GT.IR) GO TO 300
      IF(I.EQ.1) GO TO 406
      GO TO 301
  300 KKL=KKL/10
      IF(I.EQ.1) GO TO 406
  301 J1=I-1
        DO 439 J=1,J1
  439 IF (KKL.EQ.KKRN(J)) GO TO 404
  406  KKRN(I) =KKL
  441 CONTINUE
      IF(IRR.EQ.2) GO TO 419
      RETURN 1
  419 RETURN
      END
$IBMAP RANDPK                                                    RANDM000
       ENTRY   EXPRN                                             RANDM001
       ENTRY   GAURN                                             RANDM002
       ENTRY   FLRAN                                             RANDM003
       ENTRY   GETNM                                             RANDM004
       ENTRY   STORNM                                            RANDM005
 EXPRN LDQ     RANDOM                                            RANDM006
 C     PXD     952,0                                             RANDM007
 H     STA     A                                                 RANDM008
       MPY     GENERA                                            RANDM009
       STQ     COMMON+1                                          RANDM010
       STQ     COMMON                                            RANDM011
 F     MPY     GENERA                                            RANDM012
       STQ     RANDOM                                            RANDM013
       CLA     COMMON                                            RANDM014
       TLQ     B                                                 RANDM015
       LDQ     COMMON+1                                          RANDM016
       RQL     12                                                RANDM017
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        CAL     C                                                   RANDM018
        LGL     24                                                  RANDM019
        STO     COMMON                                              RANDM020
        CLA     A                                                   RANDM021
        LLS     12                                                  RANDM022
E       FAD     COMMON                                              RANDM023
G       TNZ     1,4                                                 RANDM024
        TRA     E                                                   RANDM025
B       MPY     GENERA                                              RANDM026
        STQ     COMMON                                              RANDM027
        CLA     RANDOM                                              RANDM028
        TLQ     F                                                   RANDM029
        CLA     A                                                   RANDM030
        ADM     G                                                   RANDM031
        TRA     H                                                   RANDM032
GAURN   SXD     COMMON+3,4                                          RANDM033
CC      TSX     EXPRN,4                                             RANDM034
        ADD     AA                                                  RANDM035
        STO     COMMON+4                                            RANDM036
        TSX     EXPRN,4                                             RANDM037
        STO     COMMON                                              RANDM038
        FSB     BB                                                  RANDM039
        STO     COMMON+1                                            RANDM040
        LDQ     COMMON+1                                            RANDM041
        FMP     COMMON+1                                            RANDM042
        SUB     COMMON+4                                            RANDM043
        TPL     CC                                                  RANDM044
        LXD     COMMON+3,4                                          RANDM045
        CLA     COMMON                                              RANDM046
S       LDQ     RANDOM                                              RANDM047
        RQL     20                                                  RANDM048
        LLS     0                                                   RANDM049
        TRA     1,4                                                 RANDM050
FLRAN   LDQ     RANDOM                                              RANDM051
        MPY     GENERA                                              RANDM052
        STQ     RANDOM                                              RANDM053
        CLA     AAA                                                 RANDM054
        LGL     28                                                  RANDM055
        FAD     AAA                                                 RANDM056
        TRA     S                                                   RANDM057
GETNM   CLA     RANDOM                                              RANDM058
        STO*    3,4                                                 RANDM059
        TRA     1,4                                                 RANDM060
STORNM  CLA*    3,4                                                 RANDM061
        STO     RANDOM                                              RANDM062
        TRA     1,4                                                 RANDM063
GENERA  OCT     343277244615                                        RANDM064
RANDOM  DEC     30517578125                                         RANDM065
AA      OCT     001000000000                                        RANDM066
BB      DEC     1.                                                  RANDM067
AAA     OCT     172000000100                                        RANDM068
A       OCT     00021700000                                         RANDM069
COMMON  BSS     5                                                   RANDM070
        END                                                         RANDM071
$DATA
  1  1  1150  9 14 (9I2)(14I2)
30517578125
THE PURPOSE OF THIS S"UDY IS TO MEASURE THE MEANINGS OF CERTAIN THINGS TO VARI
OUS PEOPLE BY HAVING THEM JUDGE THEM AGAINST A SERIES OF DESCRIPTIVE SCALES.
IN TAKING THIS TEST, PLEASE MAKE YOUR JUDGEMENTS OF THE BASIS OF WHAT THESE TH
INGS MEAN TO YOU.  ON EACH PAGE OF THIS BOOKLET YOU WILL FIND A DIFFERENT CONC
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EPT TO BE JUDGED AND BENEATH IT A SET OF SCALES. YOU ARE TO RATE THE CONCEPT ON EACH OF THESES SCALES IN ORDER. HERE IS HOW YOU ARE TO USE THESE SCALES. IF TOU FEEL THAT THE CONCEPT AT THE TOP OF THIS PAGE IS VERY CLOSELY RELATED TO ONE END OF THE SCALE, YOU SHOULD PLACE YOUR CHECK MARK AS FOLLOWS

FAIR X / / / / / / UNFAIR
OR FAIR / / / / / / X UNFAIR

IF YOU FEEL THAT THE CONCEPT IS QUITE CLOSELY RELATED TO ONE OR THE OTHER END OF THE SCALE (BUT NOT EXTREMELY), YOU SHOULD PLACE YOUR MARK AS FOLLOWS

STRONG / X / / / / / WEAK
OR STRONG / / / / / X / WEAK

IF THE CONCEPT SEEMS ONLY SLIGHTLY RELATED TO ONE SIDE AS OPPOSED TO THE OTHER SIDE (BUT IS NOT REALLY NEUTRAL), THEN YOU SHOULD CHECK AS FOLLOWS

ACTIVE / / X / / / / PASSIVE
OR ACTIVE / / / / X / / PASSIVE

THE DIRECTION TOWARD WHICH YOU CHECK (OF COURSE) DEPENDS UPON WHICH OF THE TWO ENDS OF THE SCALE SEEM MOST CHARACTERISTIC OF THE THING YOU ARE JUDGING. IF YOU CONSIDER THE CONCEPT TO BE NEUTRAL ON THE SCALE, BOTH SIDES OF THE SCALE EQUALLY ASSOCIATED WITH THE CONCEPT, OR IF THE SCALE IS COMPLETELY IRREVELENT , UNRELATED TO THE CONCEPT, THEN YOU SHOULD MARK THE SCALE AS FOLLOWS

SAFE / / / X / / / DANGEROUS

IMPORTANT (1) PLACE YOUR CHECK MARKS IN THE MIDDLE OF THE SPACES, NOT ON THE BOUNDRIES / / X /
(2) BE SURE YOU CHECK EVERY SCALE FOR EVERY CONCEPT DO NOT OMIT ANY
(3) NEVER PUT MORE THAN ONE CHECK MARK ON A SINGLE SCALE.

SOMETIMES YOU MAY FEEL AS THOUGH YOU HAVE HAD THE SAME ITEM BEFORE ON THE TEST. THIS WILL NOT BE THE CASE, SO DO NOT LOOK BACK AND FORTH THROUGH THE ITEMS. DO NOT TRY TO REMEMBER HOW YOU CHECKED SIMILAR ITEMS EARLIER IN THE TEST. DO NOT WORRY OR PUZZLE OVER INDIVIDUAL ITEMS. IT IS YOUR FIRST IMPRESSI ONS, THE IMMEDIATE FEELINGS ABOUT THE ITEMS, THAT WE WANT. ON THE OTHER HAND PLEASE DO NOT BE CARELESS, BECAUSE WE WANT YOUR TRUE IMPRESSIONS.

1 2 5 7 3 4 9 6 8
1 3 2 9 611 71314 41210 5 8

SOCIAL STUDIES
MATHEMATICS
SCIENCE
TEACHING CHILDREN SOCIAL STUDIES
TEACHING CHILDREN MATHEMATICS
TEACHING CHILDREN SCIENCE
LANGUAGE ARTS
TEACHING CHILDREN LANGUAGE ARTS
TEACHING CHILDREN

HEAVY	LIGHT
SAD	HAPPY
ACTIVE	PASSIVE
HARD	SOFT
GOOD	BAD
SLOW	FAST
DIFFICULT	EASY
FEMININE	MASCULINE
HEAVENLY	HELLISH

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COLD                    HOT
NEGATIVE                POSITIVE
AWFUL                   NICE
OPTIMISTIC              PESSIMISTIC
WEAK                    STRONG
  1  1  8100  9 14 (9I2)(14I2)
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